Welcome

Welcome to Principles of Environmental Science! In this course, we position ourselves with our feet on the UW-Madison campus and ask questions about the energy we use to heat and cool our buildings, the food we eat, the air we breathe, the electricity we use to power lights and appliances, the goods we purchase, and the waste we create.

Ultimately, the goal of this course is to give you the tools to see the world around you in new ways, noticing things you may have missed and encouraging you to seek paths that both care for yourself and for all with whom you share this planet. This course truly is a blend of environmental studies and sciences - we use principles of chemistry, physics, and biology to understand our earth systems, but we also explore societal issues like public health and social justice, and we do it all through the context of sustainability.

Through concrete, contextualized experiences (lab investigations and field trips), we'll make the invisible visible. Using the campus as a microcosm, you will encounter global environmental problems and solutions at the scale of our campus, which can then translate to the wider world.

On campus, you will learn about sustainability-related initiatives, including those of the Office of Sustainability, the Wisconsin Union, and the UW-Madison Division of Facilities Planning & Management (FP&M for short). This semester, our laboratory space is back in the Wisconsin Energy Institute (WEI). Some weeks in lab will highlight features of WEI to showcase sustainable building design on our campus.

Off campus, our lab activities will travel to places in Madison that can help you see the bigger picture of energy, food, and waste. Some examples include the Dane County Landfill and the Aldo Leopold Nature Center. This semester there always will be a contingency plan should lab need to go virtual for any reason. Your instructors will be as nimble as possible.

This course rests on several core principles from environmental science, a multidisciplinary field:

- We live on a finite planet.
- On this planet, our actions connect across space to neighbors near and far.
- Our actions also connect across time to past and future generations.
- Even though the connections may be difficult to perceive, they have profound implications and are worthy of our attention.

Instructors

			
Name	Dr. Tim Lindstrom	Ms. Audrey Stanton	Mr. Nick Hoffman
Role	Instructor	TA for Section 302 and Section 303	TA for Section 301 and Section 304
Email	timothy.lindstrom@wisc.edu	apstanton@wisc.edu	nhoffman9@wisc.edu
Office Hours	9 am – 12 pm Thursdays in Meiklejohn House (please email at least one day in advance to schedule)	Right after lab, or email to schedule a virtual conference	Right after lab, or email to schedule a virtual conference

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Logistics

Link to this course in the UW-Madison Course Guide

Course Name and Number: Principles of Environmental Science. Environmental Studies and Integrated Liberal Studies (ENVIR ST/ILS) 126.

Credits: 4

Course Designations and Attributes:

- Level: Elementary
- Breadth: Physical Sciences
- L&S Credit Type: C
- Section 301: Honors

Course Description:

This course relates principles of environmental science to our daily activities, with an emphasis on sustainability, conservation, and systems thinking. It introduces science as a process of inquiry and discovery rather than a pre-established set of facts. Topics relate to energy, food, carbon, and waste, with sub-topics including water use, electric power, supply chains, buildings, transportation, land use, and social justice.

Prerequisities: None

Meeting Times:

- Lecture: 1:00 – 2:15 pm Tuesdays and Thursdays
- Lab: 3:30 – 6:30 pm Tuesdays (Sections 301/302) or Thursdays (Sections 303/304)

Meeting Location:

- Lecture: 125 Agricultural Hall
- Lab: 1115 Wisconsin Energy Institute

Instructional Mode: All face-to-face, but can migrate to synchronous and Zoom/Teams should lecture or lab need to go virtual to comport with public health requirements.

Regular and Substantive Student-Instructor Interaction: Through twice-week 75-min lectures, weekly 3-hour labs, facilitated discussion, group work, weekly assignments with feedback, and optional office hours, this course meets all the attributes included in the requirements for regular and substantive student-instructor interaction.

Substantive interaction is engaging students in teaching, learning and assessment through at least two of the following: direct instruction, providing feedback on student work, providing information about course content, facilitating discussion of course content, or other substantive interaction. Regular interaction is: predictable and scheduled interaction with students consistent with the course length (usually at least weekly but more often in a course of short duration). Regular and substantive student-instructor interaction, as defined by the US Department of Education (Within 34 C.F.R. §600.2), is always a requirement of UW-Madison for-credit learning activities.

Canvas URL: https://canvas.wisc.edu/courses/285718

Textbook:

Title:	How Bad Are Bananas?: The Carbon Footprint of Everything
Author(s):	Mike Berners-Lee
Publisher:	Greystone Books (2011)
ISBN 10:	1553658310
ISBN 13:	9781553658313
Edition:	1st
PDF link:	Access the PDF of the book directly in Drive

Credit Hours:

From the UW-Madison Credit Hour Policy:

Carnegie definition of 1 credit hour: *"One hour of in class or direct faculty / instructor instruction and a minimum two hours of out of class student work each week over approximately 15 weeks, or an equivalent amount of engagement over a different number of weeks. This is the status quo and represents the traditional college credit format used for decades."*

Weekly task	Hours per week
In class:	
Attend lecture	2.5
Attend lab	3
Out of class:	
Prepare for and review lecture	1
Prepare for and review lab	1.5
Prepare for weekly SQQs	2

Non weekly task	Hours per semester
Prepare for 2 midterm exams and 1 final exam	16
Final exam take-home portion	12
Complete final exam	2

Course Outline (direct link to course outline)

Course Learning Outcomes

LO1: Identify drivers of climate change and describe effects both locally and globally

LO2: Explain sustainability as depicted in models of the Triple Bottom Line

LO3: Analyze sustainability issues and/or practices using a systems-based approach

LO4: Explain the social, economic, and environmental dimensions of the sustainability challenges of operating a large public research institution

LO5: Use sustainability principles for developing personal goals and professional values

LO6: Connect the sustainability of campus systems to local, national, and global contexts and

compare/contrast top-down versus bottom-up approaches to addressing sustainability issues on our campus and in the wider world

LO7: Explain the intersection of sustainability goals with issues relating to communities of color and First Nations communities, particularly in Dane County and Wisconsin

LO8: Value the human and natural capital necessary to sustain our life support systems on this planet

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Course Unit Objectives

Unit 1 - Energy & Sustainability

UO1: Describe the basic elements of the UW-Madison campus energy infrastructure, including the operation of the Charter Street Heating and Cooling Plant

UO2: Express energy in terms of joules and kilowatt-hours, converting between the two

UO3: Contrast renewable and non-renewable fuel sources from the perspective of economic and environmental impacts

UO4: Describe initiatives that the physical plant have taken to reduce the energy footprint of the UW-Madison campus

UO5: Categorize different approaches that an individual or a campus can employ to reduce energy consumption

Unit 2 - Carbon Cycle & Air Quality

UO1: Explain how a carbon footprint is both a metaphor and a shorthand

UO2: Compare and contrast major air pollutants and greenhouse gasses, including their origins and their human and planetary effects

UO3: Use models of the global carbon cycle to describe its major components, flows, and connections to global climate change

UO4: Describe the basic mechanisms that drive atmospheric warming

UO5: Develop a “carbon sense” for the climate change impact of various actions and processes

Unit 3 - Food & Supply Chains

UO1: Identify the primary and secondary vendors that supply food to UW-Madison

UO2: Critique various approaches that can reduce the environmental impact of individual diets

UO3: Identify solutions throughout a food supply chain that address issues related to food waste

UO4: Analyze a model of a campus food supply chain, identifying primary, secondary, and tertiary sources of greenhouse gasses

UO5: Apply sustainability principles to assessing the impacts of our food systems

Unit 4 - Waste & Plastics

UO1: Identify major waste streams at UW-Madison and the entities that manage them

UO2: Explain the relationship between plastics and hydrocarbons, using the terms "monomer" and "polymer"

UO3: Classify types of plastic by their uses, physical & chemical properties, and recyclability

UO4: Contrast approaches to waste management that include recycling, composting, and reuse

UO5: Describe the idea of "responsible consumerism" in the context of addressing socio-environmental issues within the clothing/fashion industry

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COVID-19

Please follow all COVID-19 university guidelines and protocols (information can be found at https://covidresponse.wisc.edu/).

The past two years have imparted some harsh truths, one of which is that in-person instruction is a gift and a privilege. In this course, we will do our part to *sustainably* meet as a group. Below is a list of course expectations this semester for both students and instructors.

- Public health comes first. If you know that you have been exposed to COVID-19 or are feeling any symptoms (fever, cough, chills, achy, etc.), then you should stay home and contact University Health Services.
- All students in this course will wear a facial covering at all times when inside the lecture and laboratory space. Thoroughly wash your hands every time you leave these spaces for any reason. These rules apply to your instructors, too.
- If you have to miss lecture or lab for any reason, your instructors will work with you to make up any missed content. You will never be penalized for putting your health and the health of others first.

It goes without saying, but this semester we all need to be a bit more cautious and responsible with our behavior. Be judicious about what you do and who you interact with on and off campus, and let's all try to be gracious and understanding with each other in this time. Not surprisingly, there are sustainability lessons to be found throughout this unique experience.

Laboratory (direct link to laboratory schedule)

We have assembled a set of weekly activities that will coordinate closely with what you learn in lecture. Most weeks, lab will last the full three hours.

Each week's laboratory activity will be submitted via Canvas by the following Thursday before midnight. You will be graded based on completion of the activity as well as the accuracy of your responses to several spot-graded questions. Each week's lab is worth 20 points.

Feel free to upload your lab report early. The penalty for late submission of a lab activity is 2 points (10%). Anything after 11:59 pm on Thursday the week after the lab is considered late, though you may still get partial credit for late submissions. If you know that you will miss a due date for a given lab, contact your TA ahead of time to request an extension.

The questions in lab activities are fair game for assessments. No surprises! Questions from your lab manual will be taken word-for-word except for small changes in style to fit the format of an assessment.

Arriving to lab on time is important! We need everybody assembled to launch the activities of the day. If for some reason you know you will arrive late, please inform your TA as early as you're able. Normally, on-time arrival is worth 2 points. *However, due to COVID-19 uncertainties we will not be tying your lab attendance to your grade this semester.*

We typically do not offer make-up labs because of logistical difficulties. If for some reason you need to miss lab, please inform your TA at least 24 hours before your lab period. With enough lead time, you may be able to attend another section or make other arrangements. Normally, missing 2 lab periods means the highest grade you can earn is a D. If you miss 3 or more labs, it is an F. This is a UW-Madison rule for physical science lab courses. *Once again, due to COVID-19 uncertainties we will not be tying your lab attendance to your grade this semester.*

Safety counts! Each week, check the lab activity cover page carefully for any safety precautions. Also check the need for proper dress attire. Some field trips and lab activities require proper clothing and shoes.

Tim, Audrey, and Nick take music requests in lab. In Spotify, we've created Environmental Studies 126 playlists from SP18, SP19, FA19, SP20, FA20, SP21, and FA21. We'll use your

responses from the Student Information Survey in Canvas to make a Spring 2022 playlist as well. Always feel free to send us artists or songs to add to the playlist!

Grading

For specific points, due dates, and grading details for assignments, refer to the Grades or the Assignments pages. All assignments, quizzes, and exams are also listed in Canvas Modules by semester week.

This course is set up to promote your success! For example, grades are assigned on a point scale. If you earn an A, you receive an A. This means that you are not competing with your classmates. Instead, we hope you will work together, enjoy each other's company, and perform well.

This course is set up to promote your success! As another example, your instructors will give you feedback via the sample quiz questions (SQQs) each week. The questions are pre-announced, so there are no surprises. You will get clear signals about what is important to know for assessments in this course.

This course is set up to promote your success! As one last example, your TAs are available each week in lab to answer your questions. Feel free to consult with them if you need help.

Please keep in touch. During the semester, things unexpectedly may happen that will affect your ability to study. Let us know when problems arise, and we will work with you to find solutions.

Assigning Final Grades

Your point total determines your grade. Some points, such as those for SQQs, are easier to obtain because the questions are open-note. Strive to get all of them! Same thing goes for lab activity points. Your instructors will assist you in lab to properly answer some questions in the write-up; others will be answered in lecture. You are always welcome to ask questions too!

Exam points are harder to earn. Even so, most students perform quite well on them. Exam scores typically average around 80% (in contrast to SQQs for which the average is closer to 90%).

A ≥92.0%
AB 90.0-91.9%
B 82.0-89.9%
BC 80.0-81.9%
C 70.0-79.9%
D 65.0-69.9%
F ≤64.9%

Weekly SQQs

Why a weekly review assignment?
Sample quiz questions (SQQs) provide an incentive for you to keep up. Starting in the first full week of classes, SQQ sets will be posted to Canvas every Friday and each SQQ set is due to be uploaded to Canvas the following Tuesday by 11:59 pm (late submission is a 10% penalty or 2.5 points). SQQ sets review the week's lecture content, should take between 30-60 minutes to complete, and will be spot-graded for 25 points each. As an example of "low stakes testing," the weekly SQQs will provide you with timely feedback and help you review/prepare for exams.

Can you drop your lowest SQQ score?
Yes! Although we expect the SQQ grades to run high, you still may drop your lowest score. In return for this, we do not offer make-up opportunities except in specific circumstances. Please consult your TA regarding missing or making up a weekly SQQ assignment.

Where to find help
Complete answer keys to the SQQs will not be posted, but the rubrics used to spot-grade the SQQs will be posted to Canvas (same with labs too). If you have questions, seek help from your TA, consult your lecture materials, or work together with your classmates.

Exams

Timing and coverage
This course has two in-class exams worth 150 points, each covering material from the weeks that precede it.

Exams in this course are somewhat cumulative, as some topics build upon those learned previously. Exams are designed to take 1 hour, but the entire 75-minute class period will be available. Should we need to migrate exams to a virtual format for any reason, the exams will be made available to access, take, and upload in Canvas.

A minimum of trickiness
In writing exam questions, your instructors aim to be straightforward and to send clear signals about what you need to know. We do not intend to be tricky.

This said, it is nearly impossible to construct an exam that is 100% clear and fair. Even with our best efforts, a question or two will miss the mark, meaning that somebody will think that it is unfair or tricky. After each test, your instructors will inquire about any glitches and find ways to address them. You also will have the opportunity to argue for points back on exams after they have been graded and returned.

What if you need an early exam?
Consult with your TA at least a week before the exam (but the earlier the better). We'll work with you to arrange something.

Final Exam
The final exam is cumulative, worth 175 points, and designed to take 1.5 hours. You will have 2 hours to complete it. If you have three exams scheduled in a 24-hour period, and if this exam is one of the three, please consult with your instructor at least 10 days before the exam for rescheduling. Should we need to migrate the exam to a virtual format for any reason, the final exam will be made available to access, take, and upload in Canvas.

Take-Home Activities
The end of the semester is usually a very busy time. To lessen that burden, we've taken 75 points away from the final exam and re-allocated them for you. There are four components, each worth 25 points. *You will pick three of the four to do throughout the semester.* These "take-home activities" roughly connect to the four units of the course, and the due dates for each line up accordingly. Late submission of a take-home activity will result in a 5-point deduction.

Canvas Notifications

You will receive notifications from Canvas to keep in touch with posted grades, feedback on your assignments, changes to course content, messages from your instructors, and messages from your peers. To control your notifications, you can follow this handy-dandy guide.

Canvas Mobile App and Communication

If you use a mobile device, you are expected to install the "Canvas Student By Instructure Inc." app. It is available for both Android and iOS. Your instructors will do the same. This app, combined with the "Inbox" feature of Canvas and the correct notification settings, means you can message back-and-forth with your instructors and classmates from your mobile device.

If you don't use a mobile device, you won't miss out on content, just some conveniences.

Regardless, all course communications from your instructors could come through Canvas. If you prefer to communicate with your instructors via Canvas, great. If you prefer email, that's fine too. However, everything about the course will be contained within Canvas for you. If you feel the need to contact your instructors outside of Canvas, you are welcome to do so.

Electronic Lab Notebook

You are expected to bring a charged laptop (or laptop with charger) to your lab session every week or bring a printed copy of the lab investigation. If you are unable or forget, there are two

back-up options. Instructors may have some laptops you can borrow and/or a small number of printed copies of the lab activity.

Each week's lab investigation can be accessed via Modules or the Lab Files tab in the navigation pane which links to a Google Drive folder of the lab handouts. You may download the file as a Word/PDF document or complete the handout as a Google doc online, but make sure to rename the file with your name so you have your own version and save often.

During field trips, your instructors will provide printed copies of the lab activities so that you don't need to lug laptops around.

If you print out the lab investigation, please turn in a PDF of it using Office Lens or ScanBot (both free, but ScanBot seems to handle multi-page documents better) or a desktop scanner. Though we prefer electronic files, you may turn in a hard copy if all else fails.

You can check out laptops and tablets for free from UW Info Labs.

Microsoft Office Suite

The programs in this software suite are available to UW-Madison students for free on their personally-owned computers. Installation instructions.

Rules, Rights, and Responsibilities

Link to the 2021-2022 UW-Madison Undergraduate Guide to your privacy rights, grievance rules, how to seek assistance, and responsibilities as a student.

Academic Misconduct

No form of academic misconduct will be tolerated. Any instances will result in failure of the assignment or exam, possibly failure of the course, and a letter placed in your file at the Office of the Dean of Students. Read the statement on academic misconduct from the Dean of Students.

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be

forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to the academic integrity link provided in the previous paragraph.

Accommodations for Students with Disabilities

McBurney Disability Resource Center syllabus statement: *"The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life.*

Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty, will work either directly with the student or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA."

Link to McBurney resources page.

Diversity and Inclusion

Institutional statement on diversity: *"Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.*

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world."

Link to UW-Madison diversity page.

Academic Calendar & Religious Observances

Link to information about current and future academic calendars, along with the university's religious observance policy.